Kompetenzzentrum für elektrochemische Oberflächentechnologie GmbH

AICorrSense

Machine Learning for Corrosion Protection in Aviation

CEST (Valtiner) | Uni Linz(Kralovec) | Uni Krems (Brückl) | SENZORO(Loinig)

Corrosion phenomana

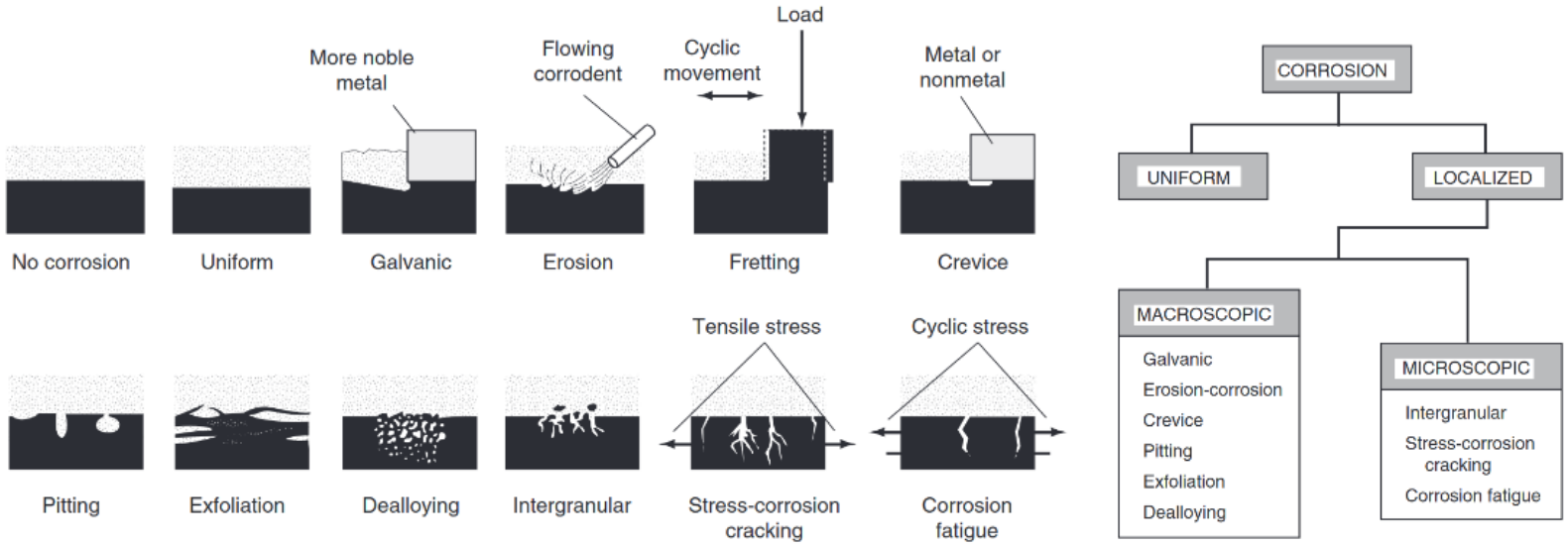

Figure 3: a) Schematic illustration of common forms of corrosion (from [11]) b) Classification of corrosion processes according to their spatial scale (also [11])

Corrosion testing I

Figure 4: DIN 55635:2019-05 chamber

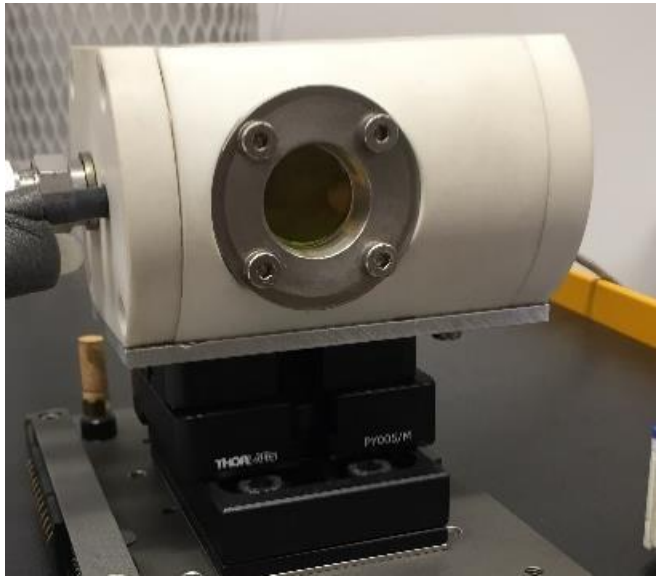

Figure 5: In-situ measurement cell available at CEST

Corrosion testing II

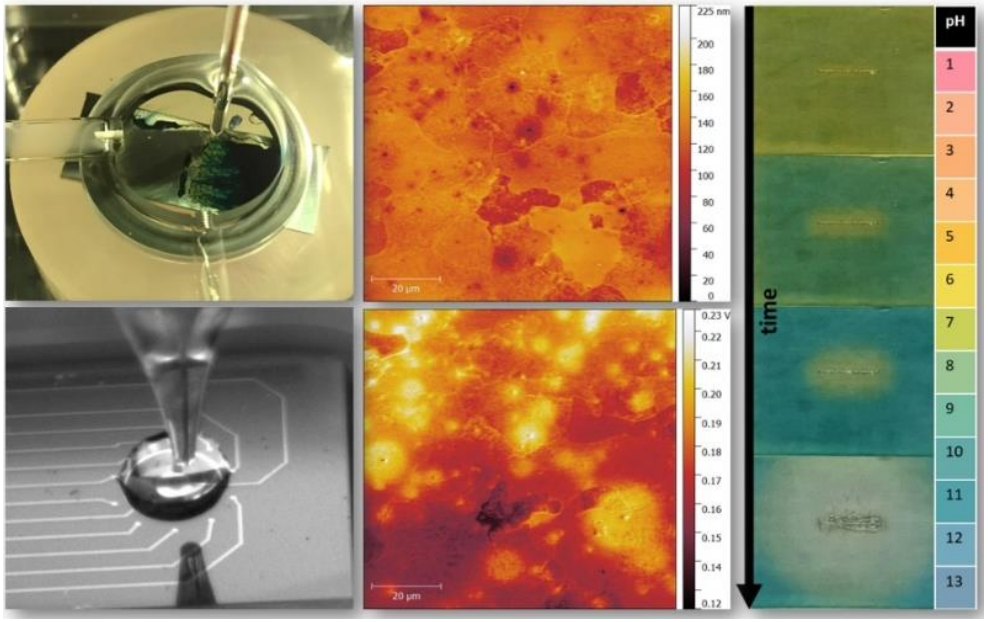

Figure 6: SECM measurement setup for investigation of surfaces with microelectrodes, middle: AFM (top) and SKPFM (bottom) scan of corrosion initiation on a steel sample, right: pH distribution surrounding a coating defect visualized with a pH-sensitive hydrogel corrosion patch

Corrosion testing III

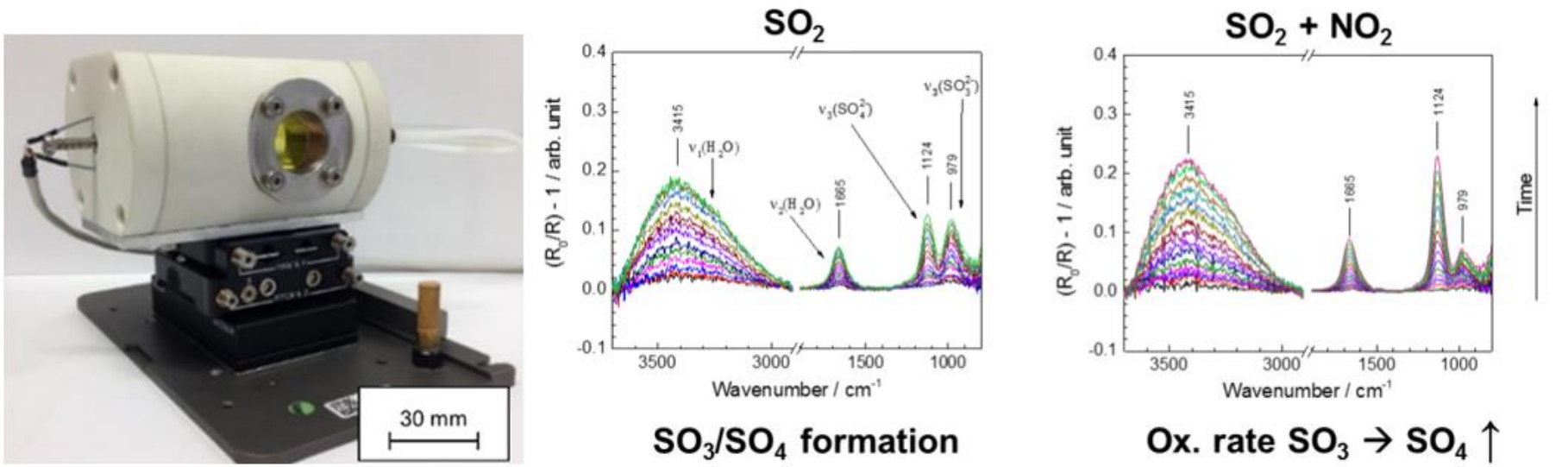

Figure 7: IRRAS Corrosion cell for measuring corrosion on galvanized steel with IR spectra as a result showing the time dependent detection of corrosion products.

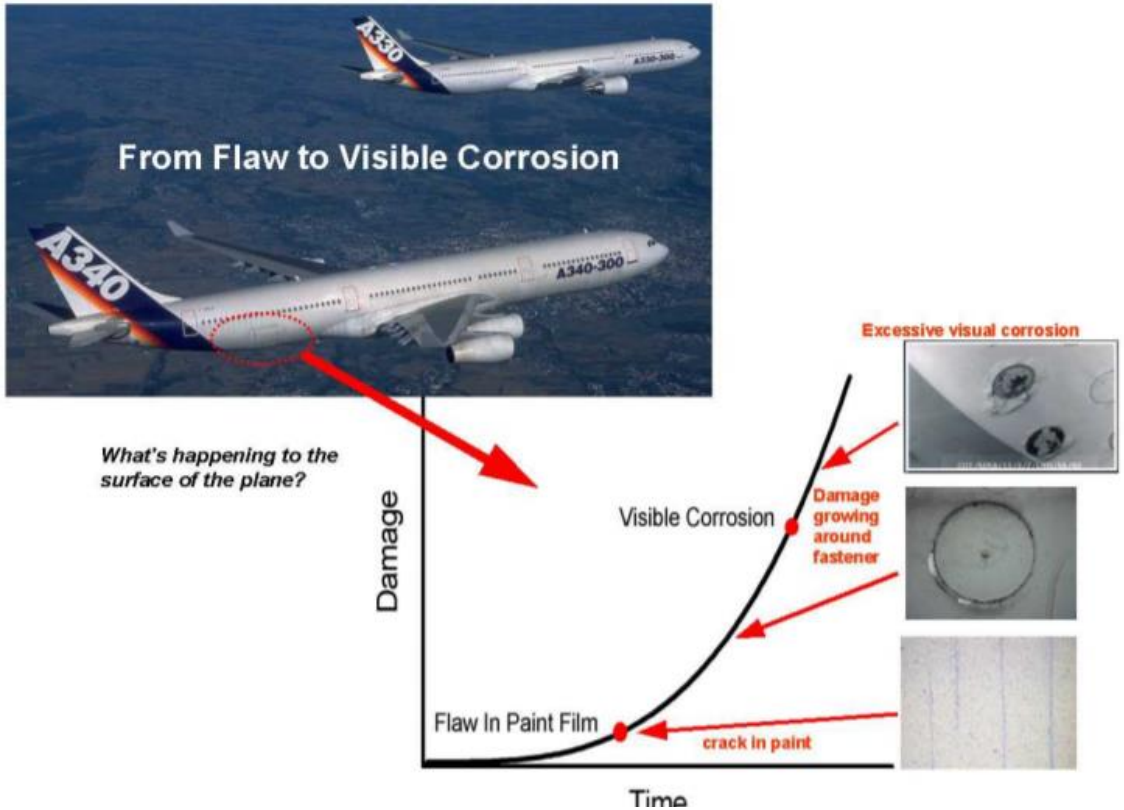

Figure 8: From flaw to visible corrosion (from [33])

Figure 9: Drawing and image of a tie rod fork end

The mission of AICorrSense

AI-CorrSense consortium:
CEST (Valtiner)/Uni Linz(Kralovec)/ Uni Krems (Brückl)/ SENZORO(Loinig)

Artificial Intelligence-based corrosion sensing and prediction for aircraft applications

Boeing 757 lower flap angle with extensive exfoliation corrosion → inspection/replacement

- Entwicklung von Labels f. AI (Corrosion/Ultraschall)
- Entwicklung eines Multisensor-Setups zur Überwachung der Korrosion (Ultraschall-, elektrochemischen und Umweltsensoren)
- Kombination mit KI-Algorithmen (neuronaler Netzwerkarchitekturen (AutoML) Trainingsdaten werden bei der Durchführung beschleunigter Korrosionstests

Ziel: Statt Inspektion → Korrosionsdetektionsmethode als Echtzeit (on board) Auswertung in Bezug auf Detektion, Lokalisierung, Typisierung und Quantifizierung